Distributed Energy & Electric Reliability Program

The Power of Choice

Infrastructure Reliability: Vital to Our Economy

Ensuring the reliable delivery of high-quality electricity is increasingly important in our information-driven economy. Yet many components of our nation's electricity infrastructure are aging and in need of replacement. Further, deregulation in the energy marketplace presents new opportunities and challenges, requiring technologies to better integrate and optimize operations across the power grid, and to manage reliability and performance within an increasingly complex system.

Developing advanced technologies to strengthen our nation's electric energy infrastructure is the mission of the Distributed Energy and Electric Reliability (DEER) Program.

An Innovative Portfolio

The DEER Program conducts research, development, demonstration, technology transfer, and education activities in partnership with industry, utilities, State agencies, universities, national laboratories, and other stakeholder organizations. The Program addresses distributed generation—using small units that generate electricity at the site where it is consumed—as well as an array of transmission, distribution, storage, and demand management technologies that can improve the reliability, efficiency, and performance of the power grid.

Specifically, the DEER portfolio includes:

- **Distributed energy generation technologies**. R&D efforts focus on industrial gas turbines, microturbines, reciprocating engines, hybrid power systems, thermally activated technologies, and energy storage, as well as such "technology base" areas as advanced materials and fuel flexibility.
- **End-use integration and distribution technologies**. Areas of R&D include combined cooling, heating, and power, communications and controls, and distribution and interconnections. The Program addresses such factors as electricity restructuring, end-use system integration, and renewable energy production incentives.
- **High temperature superconductivity** (HTS) transmission lines, motors, generators, and fault-current limiters, which enable the transmission and use of electricity at near perfect efficiencies and much higher capacity than traditional devices. Program research focuses on wires and system technology, and on applied research through the Superconductivity Partnership Initiative.
- **Transmission reliability**, with emphasis on real-time system monitoring and control, and integration of distributed energy resources.

Nationwide Benefits

Distributed energy and electric reliability technologies will help strengthen America's electric power infrastructure by:

- *Ensuring more reliable power delivery and power quality*
- *Relieving congestion on transmission and distribution systems*
- *Making our energy infrastructure less vulnerable to disruption*
- *Managing power consumption and loads*
- *Diversifying power supplies*
- *Reducing the need for new power plants to meet peak demand*
- *Improving the efficiency of power generation and transmission*
- *Reducing environmental emissions, including greenhouse gases.*

Meeting National Priorities

The DEER Program addresses priorities defined in the President's National Energy Policy. Released in May 2001, the National Energy Policy contains more than 20 recommendations to expand the development of distributed energy and electric reliability technologies and programs. To guide decision-making about Program directions and priorities, DEER also solicits opinions from experts outside the U.S. Department of Energy, by developing technology roadmaps and holding peer reviews.

The Program actively builds RD&D partnerships with industry and others to make distributed energy and electric reliability systems more energy efficient and affordable to consumers than the energy services they currently receive, while enhancing power quality and lowering environmental impacts. Distributed energy and electric reliability technologies provide utilities and consumers with more energy choices and increased control over energy usage and costs. This freedom and flexibility is essential for today's competitive energy markets.

Success Stories

Recent success stories illustrate the wide-ranging benefits of DEER technologies. One showcases the value of distributed generation technologies. When a storm interrupted grid power at the Hilton Garden Inn in Chesterton, Indiana, in June 2002, an integrated energy system kept the hotel in operation throughout the four-hour outage. Sponsored in part by the Department of Energy, the integrated energy system includes three microturbines with advanced heat recovery, providing space heating, hot water heating, and swimming pool and spa heating as well as electricity. Protected electrical circuits included the hotel kitchen, freezers, coolers, part of the lobby, hot water heating, and hall lighting. Based on this demonstrated success, the hotel has indicated interest in protecting additional key areas.

Another example of the significant technological progress being made by DEER is in high-temperature superconductivity (HTS) research, an area that holds promise for decreasing the nation's electricity grid losses and improving transmission capacity. The Superconducting Partners Initiative, a coalition formed by the Department of Energy, national laboratories, and industry, completed installation of the first HTS power delivery system at Southwire Company in Georgia. This 25-megawatt system, which transports 100 percent of electrical service to three factories, has already logged more than 16,000 hours of successful operation.

In just four years—from 1997 to 2001—the DEER Program has been instrumental in doubling the power handling capacity of HTS wire while dramatically reducing its cost from $1,000 per kilo-amp per meter to $200 per kilo-amp per meter.

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

U.S. Department of Energy
Energy Efficiency
and Renewable Energy

March 2003

Printed with soy ink on recycled paper